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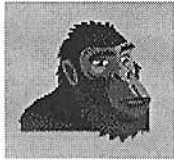
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A SCIENCE ODYSSEY

# Human Evolution

You Try It

## Text Version of Human Evolution Activity



### **Ardipithecus ramidus**

The most primitive hominid yet found, this species has more chimpanzee-like features than any other human ancestor. *Ardipithecus ramidus* may have walked upright. Other fossils discovered with *A. ramidus* suggest that the species lived in the forest.

4.4 mya

first fossils found 1992



### **Australopithecus anamensis**

Exhibiting some chimp-like characteristics, *A. anamensis*' jaws are more primitive than those of later hominids. And yet, its humerus (an arm bone) is quite human-like. Characteristics of its tibia (a lower leg bone) indicate that *A. anamensis* walked on two feet.

4.2 - 3.9 mya

first fossil found 1965



### **Australopithecus afarensis**

This species includes "Lucy," the 3.2 million year old fossil found by Donald Johanson. *A. afarensis*' small braincases and relatively large teeth and chewing muscles are similar to those of chimpanzees. However, their teeth, as well as their leg and pelvis bones, exhibit human-like characteristics. They ranged in height from three and a half feet to five feet and walked upright.

3.5 - 2.9 mya

first fossils found 1973



### **Australopithecus africanus**

Although similar in many ways to *A. afarensis*, this species had a slightly larger brain (but still only slightly larger than a chimp's brain), smaller canine teeth, and larger molars. The wear of the teeth suggests that *A. africanus* ate fruits and foliage.

3.0 - 2.4 mya

first fossils found 1924



### **Australopithecus robustus**

Believed to be roughly the same size as *A. afarensis*, *A. robustus* had a large, "robust" (heavier, thicker) skull, as well as a jaw and large teeth that were well adapted to chewing. Like some present-day apes, this species had a "sagittal crest" (a ridge running from front to back on the top of the skull) from which muscles running to the jaw were attached.

2.1 - 1.6 mya

first fossil found 1938



**Australopithecus boisei**

A. boisei is similar to A. robustus, except that its skull and teeth are even larger. Some experts consider the two closely related, both branching from another species called A. aethiopicus. Others believe A. robustus evolved from A. africanus. Like all of the other Australopithecus species, A. boisei walked upright.

2.3 - 1.1 mya

first fossil found 1959



**Homo habilis**

Homo habilis, which actually means "handy man," is apparently the first species to make and use primitive stone tools. About five feet tall and weighing 100 pounds, H. habilis had a brain that was larger than the largest Australopithecus brain, but smaller than the Homo erectus brain.

2.4 - 1.5 mya

first fossil found 1960



**Homo erectus**

The first example of Homo erectus, known as "Java Man," was discovered in Indonesia in 1893. Fossil remains of Homo erectus have since been found throughout Africa and Asia, making it the first wide-ranging hominid. Despite the primitive appearance of its skull, the erectus skeleton is very similar to that of modern humans, although more robust (thicker and heavier). Homo erectus was probably the first hominid to use fire.

1.8 mya - 300,000 years ago

first fossil found in 1893



**Homo sapiens (archaic)**

Also known as Homo heidelbergensis, this species has a brain that was larger than H. erectus' and smaller than that of a modern human. The brain was enclosed in a skull that was more rounded than H. erectus'. Fossil remains of archaic Homo sapiens have been found in Africa and Europe.

500,000 - 200,000 years ago

first fossil found in 1921



**Homo sapiens neanderthalensis**

Averaging five and a half feet in height and possessing short limbs, Neanderthals were well-adapted to living in a cold climate. Attached to their robust (thick and heavy) bones were powerful muscles. The Neanderthal's brain was larger than the brain of living humans, although its shape was longer from front to back and not as rounded in the front.

230,000 - 30,000 years ago

first fossil found in 1856



**Homo sapiens (modern)**

Modern Homo sapiens, also known as Homo sapiens sapiens, have been around for the past 120,000 years. Homo sapiens living about 40,000 years ago made elaborate tools out of bone, antler, ivory, stone, and wood, and produced fine artwork in the form of carvings and cave paintings.

120,000 years ago - present

## Fact Files: *Gigantopithecus blacki*: (j-eye-GANT-oh-PITH-ikus BLA-kee)

**Meaning:** 'Gigantic Ape of Black' after the 20th century archaeologist Davidson Black.

**Lived:** 6.3 million – 200,000 years ago.

**Range:** South East Asia.

**Diet:** Bamboo, durian, jackfruit.

**Size:** 300 cm / 544 kg.



Views 1 | 2 | 3

### Description | Evidence

Standing an enormous 3 metres (9' 10") in height, *Gigantopithecus* may be the largest primate ever to have walked the Earth.

It fed on bamboo in the dense forests of South East Asia. *Gigantopithecus* had a broad, short face with a massive jaw and teeth designed for stripping bamboo shoots.

Like other big herbivores, *Gigantopithecus* was probably a slow mover. But it had little need for speed. Its feeding habits required it to do little more than move from place to place as it systematically stripped vegetation from its surroundings.

*Homo erectus* may have hunted and eaten juvenile or injured *Gigantopithecus*, but it is unlikely they would have taken on an enormous adult.

*Gigantopithecus* males were much larger than the females, suggesting there may have been strong competition for mates amongst males.

► [More about \*Gigantopithecus\*](#) from the University of Iowa (this will close this popup window).

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## Fact Files: Australopithecus afarensis: (oss-trah-lo-PITH-i-kus afa-REN-sis)

**Meaning:** 'Southern Ape of Afar' after the Afar region of Ethiopia.

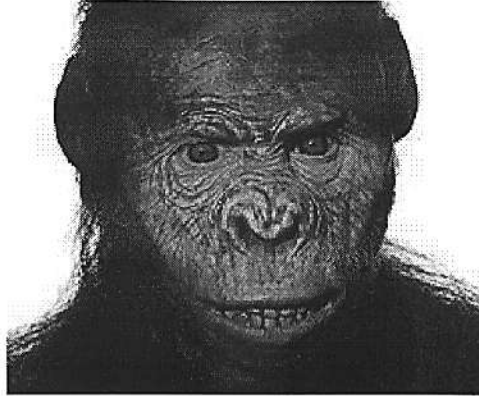
**Lived:** 3.9 - 3.0 million years ago.






**Range:** East Africa.

**Diet:** Soft fruit, nuts, seeds, tubers and bird eggs.

**Size:** *M*: 152cm / 45kg *F*: 107cm / 28 kg.

**Brain Size:** 35% the size of a modern brain. **Views** 1 | 2 | 3 | 4 | 5



-  **Audio**
-  **Zoom**
-  **Movie**
-  **Scale**
-  **Skull**

### Description | Evidence

*Australopithecus afarensis* walked upright like a human, but its body proportions were like those of a chimpanzee. Like chimps, *afarensis* had a small brain, long, dangly arms, short legs and a cone-shaped torso with a large belly.

Around 3.2 million years ago, this bipedal ape roamed a mixed habitat of savannah and woodland beside lakes and floodplains. It foraged for fruit, seeds and nuts and may even have eaten some meat.

*Australopithecus afarensis* probably climbed into trees to avoid sabre-toothed cats like *Dinofelis* and to sleep in safety at night.

This hominid seems to have lived in social groups of between 20 and 30. These groups were probably like those of chimpanzees, with dominance hierarchies in which each individual knows their place. Male *afarensis* probably cooperated to drive away predators. Once mature, females may have joined other troops of *afarensis*.

► [More about \*Australopithecus afarensis\*](#) (this will close this popup window).

## Fact Files: Homo rudolfensis: (HOM-oh ROO-doll-FENCE-iss)

**Meaning:** 'Rudolf Man'.

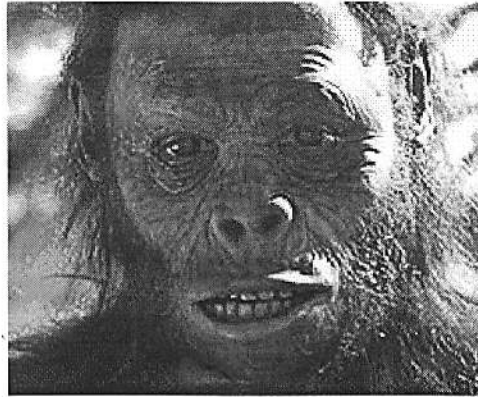
**Lived:** 2.4 - 1.9 million years ago.

**Range:** East Africa.

**Diet:** Omnivorous diet.

**Size:** *M*: 160cm / 60kg *F*: 150cm / 51kg.

**Brain Size:** 56% the size of a modern brain.



Zoom  
Scale

Views 1 | 2 | 3 | 4

### Description | Evidence

*Homo rudolfensis* may have lived over a wide area of East Africa, from Ethiopia in the north to Malawi in the south.

They were very tall, towering above other hominids alive at the time – especially the stumpy *Homo habilis*. Their faces were large and flat in comparison with those of *habilis*, with flared cheekbones and big molar teeth.

Like *Homo habilis*, *rudolfensis* probably combined foraging with scavenging meat from animal carcasses. This may have put the two species in competition with each other.

The large body size of *rudolfensis* may have made it more effective at scaring away other animals from kills, turning it into an effective scavenger.

► [More about \*Homo rudolfensis\*](#) (this will close this popup window).

## Fact Files: Paranthropus boisei: (pa-RAN-throw-puss BOY-zee-eye)

**Meaning:** 'Near man of Boise' after Charles Boise, financial patron of the Leakey family.

**Lived:** 2.3 - 1.2 million years ago.






**Range:** East Africa (Ethiopia, Tanzania, and Kenya).

**Diet:** Nuts, tubers, termites, possibly papyrus rhizomes.

**Size:** *M*: 137cm / 49kg *F*: 124cm / 34kg

**Brain Size:** 39% the size of a modern brain.



-  **Audio**
-  **Zoom**
-  **Movie**
-  **Scale**
-  **Skull**

Views 1 | 2 | 3 | 4 | 5

### Description | Evidence

This vegetarian apeman had a big, flat face with a massive jaw. It lived at a time when forests were vanishing from East Africa, creating a shortage of food such as soft fruit.

*Paranthropus boisei* coped with the shortage by evolving a massive jaw and huge teeth to chomp tough-to-chew foods such as nuts, roots, seeds and tubers.

These hard, gritty foods were more abundant in the open woodland and grasslands that *boisei* called home.

*Paranthropus boisei* may have lived in groups organized in harems, in which one male mated with many females. Males were easy to spot amongst a harem of females; they were much more muscular with much bigger faces.

► [More about \*Paranthropus boisei\*](#) (this will close this popup window).

## Fact Files: Homo habilis: (HOM-oh HA-bill-iss)

**Meaning:** 'Handy man'.

**Lived:** 2.2 - 1.6 million years ago.






**Range:** Eastern and southern Africa.

**Diet:** Omnivorous diet.

**Size:** M: 131cm / 37kg F: 100cm / 32 kg.

**Brain Size:** 47% the size of a modern brain.



-  Audio
-  Zoom
-  Movie
-  Scale
-  Skull

Views 1 | 2 | 3 | 4 | 5

### Description | Evidence

*Homo habilis* had a short body and long ape-like arms like the australopithecines. But they were distinguished from earlier hominids by their big brain (c. 630 cubic centimetres) and small teeth.

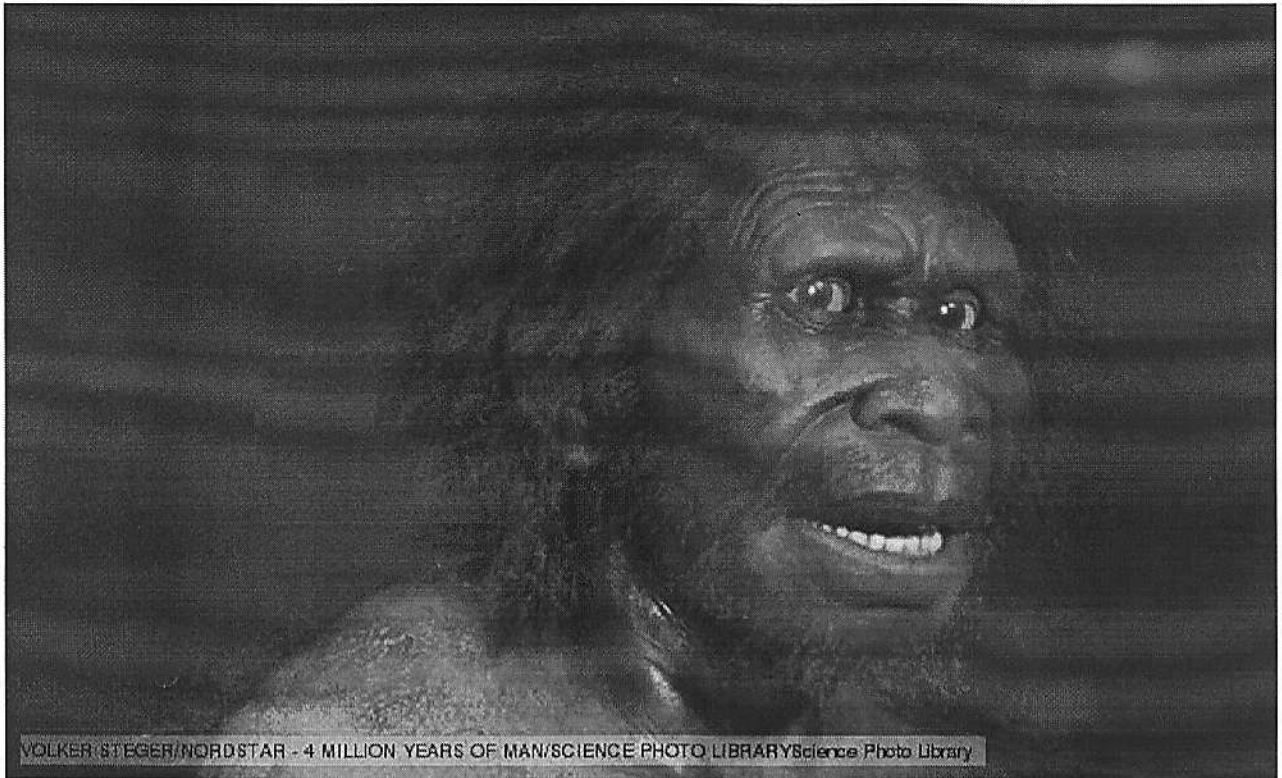
The species evolved in Africa at a time when traditional forest foods like fruit were becoming scarce forcing animals to seek out new nutritional sources.

*Homo habilis* ate meat by scavenging from animal carcasses. But snatching meat from under the noses of fearsome predators like lions was a risky business.

However, *Homo habilis* had a secret weapon: stone tools. Crude stone implements were used to smash open animal bones and extract the nutritious bone marrow.

*Homo habilis* lived in East Africa at the same time as *Paranthropus boisei*. But they they occupied different ecological niches and so were not direct competitors. While *habilis* was an omnivore, *boisei* survived on a hard-to-chew vegetarian diet.

► [More about \*Homo habilis\*](#) (this will close this popup window).



## Homo erectus

Debate continues over whether Homo erectus is a human ancestor. If Homo erectus and Homo ergaster are identified as separate species, Homo erectus would be a sibling rather than a true ancestor. Homo erectus was a successful, long-lived species that migrated out of Africa. Possibly the first humans to live in hunter-gather societies, they also used rafts to travel the oceans. One of the first specimens identified as Homo erectus was the Java Man fossil discovered in 1891. Originally named Pithecanthropus erectus, it was not recognised as a close human relative at first, as old theories held that our ancestors would have had human brains and ape-like bodies, rather than the converse.

Scientific name: Homo erectus

Rank: Species

### Common names:

upright man

### Behaviours

Discover what these behaviours are and how different plants and animals use them.

## Fact Files: Homo heidelbergensis: (HOM-oh hide-ul-ber-GEN-sis)

**Meaning:** 'Heidelberg Man'.

**Lived:** 600,000 - 200,000 years ago.






**Range:** Africa, Europe.

**Diet:** Omnivorous with a heavy reliance on meat.

**Size:** *M*: 180cm / 80kg *F*: 157cm / 51kg.

**Brain Size:** 93% the size of a modern brain.



-  Audio
-  Zoom
-  Movie
-  Scale
-  Skull

Views 1 | 2 | 3 | 4 | 5

### Description | Evidence

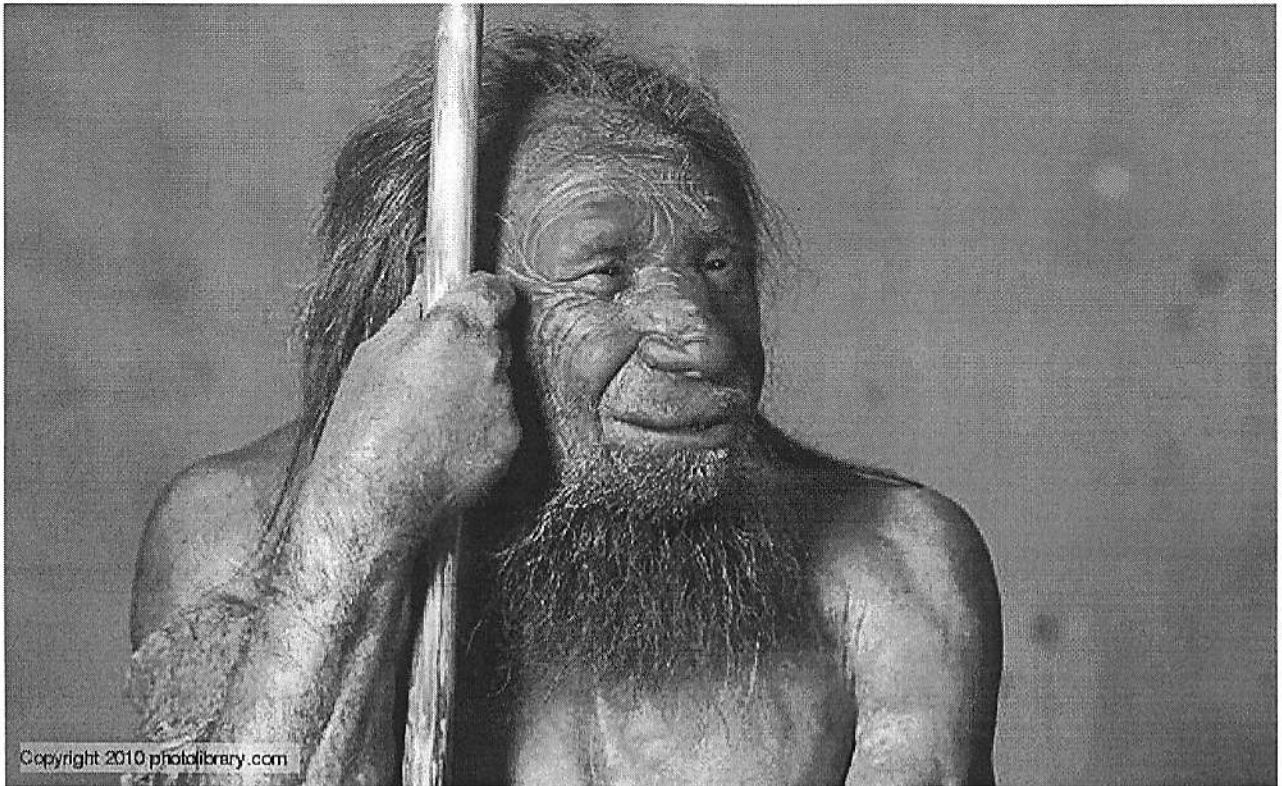
*Homo heidelbergensis* inhabited Africa and Europe 600,000 – 200,000 years ago. Males were tall, as much as 180cm (6'0") in some cases, and very muscular.

Their faces were sometimes very large, and most had projecting brow ridges and a sloping braincase that housed a brain nearly the size of a modern human's. Male *heidelbergensis* were noticeably bigger than the females.

They were proficient hunters. In Europe, they seem to have targeted large animals to hunt. Horses, hippos and rhinos were all on the menu for *heidelbergensis*.

About 300,000 years ago at present day Boxgrove in England, *heidelbergensis* manufactured huge numbers of stone tools to butcher big game animals.

► [More about \*Homo heidelbergensis\*](#) (this will close this popup window).



## Neanderthal

Neanderthals looked much like modern humans only shorter, more heavily built and much stronger, particularly in the arms and hands. Their skulls show that they had no chin and their foreheads sloped backwards. The brain case was lower but longer housing a slightly larger brain than that of modern humans. As almost exclusively carnivorous, both male and female Neanderthals hunted. Evidence of a huge number of injuries - like those sometimes seen in today's rodeo riders - suggests that hunting involved dangerously close contact with large prey animals.

Scientific name: *Homo neanderthalensis*

Rank: Species

### Common names:

Man of the Neander Valley

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By the time of William Golding's novel 'The Inheritors' (1955), Neanderthals had become simple folk whose quiet existence is shattered by warlike invaders - human beings. However, palaeoanthropologists still do not agree on many aspects of Neanderthal biology and behaviour. Controversy still rages, particularly over their relationship to modern humans.

## What did Neanderthals look like?

Neanderthal man, or *Homo neanderthalensis*, had a jutting nose set in a large face with massive brow ridges and no chin. From around 190,000 years ago, they lived across Europe and the southwest of Asia, from Britain in the West to Iraq in the East. They evolved from *Homo heidelbergensis* populations that inhabited Europe in the Pleistocene.

## How did they survive the Ice Age?

During the Pleistocene, the polar ice caps were locked in a cycle of retreat and advance. When they retreated, temperatures climbed and deciduous forest covered Europe. When the ice caps advanced, temperatures plummeted and the landscape turned into snowy tundra. In order to survive these ice ages, *heidelbergensis* evolved physical adaptations to the cold, and became the Neanderthals.

The Neanderthals lost the tall, strapping physique of *heidelbergensis* and developed a short, stocky body that was an ideal shape for conserving heat. They were also extremely muscular in order to cope with the demands of a gruelling Ice Age lifestyle. This physique developed early in childhood.

"An eight-year-old Neanderthal is at the same developmental stage as a 12-year-old modern human," says Christoph Zollikofer, an anthropologist at the University of Zurich.

## Meat-eating hunters

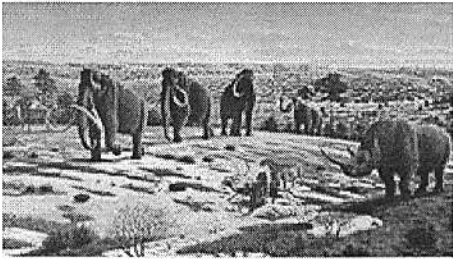
The Neanderthals were committed carnivores, and in order to obtain enough animal meat to survive, they needed to be skilled hunters. Neanderthals hunted bison, auroch (an ancestor of living cattle), deer, reindeer and musk ox, to name but a few.

They probably trapped their prey in bogs or on deep stream banks before closing in with their spears and making a kill at close range. A high rate of head and neck trauma in Neanderthals matches the pattern seen in present-day rodeo riders suggesting that, like these sportsmen, Neanderthals were tackling big animals up close and getting thrown off them.

"They do seem to have gone in for a much more in-your-face culture. That was reflected in the way they went in for the food quest. It was the same sort of pattern," says Gamble. "This applied to the

warmer periods. There were at least 20 cycles of this advance and retreat.

## What their world was like



Ice age

The last ice age hasn't ended, the climate has just warmed up a bit causing the ice sheets to retreat. When the ice was more extensive, our climate was very different.

## Fossil types

Learn more about the other animals and plants that also form these fossils.



Trace fossils

It's not only the actual bodily remains of dead animals and plants that can become fossils. Things created or left behind by animals can also fossilise, such as their footprints, burrows and dung.

## Neanderthals: challenging the perception

Neanderthals were skilled hunters with complex societies. So why did they die out? And could they have passed some of their genes on to us?

For many people, Neanderthals conjure mental images of hairy, stooping brutes with more brawn than brains. At the turn of the last century, this is exactly how they were viewed by academics and public alike. But by the 1950s, experts were lining up to challenge this interpretation, as new finds were made and existing evidence was revised.

## Lessons from literature

This shift in thinking is best illustrated by the way they are depicted in two popular 20th century novels. In 'The Grisly Folk' (1921) H. G. Wells portrayed the Neanderthals as backward creatures who deserve their annihilation at the hands of modern humans. "It's appalling," says Clive Gamble of the Centre for the Archaeology of Human Origins at the University of Southampton, England. "It's portrayed as a sort of mercy killing."

way they built their societies, which I think were based on face-to-face interaction."

## Care in the community

Social relations were important to the Neanderthals, and these were maintained through language. The Neanderthal hyoid bone, which holds the voice box in place, shows they were capable of complex speech. But their sentences were probably basic. "I think they spoke in the imperative a lot: 'Give me the object' rather than 'Could you perhaps give me the object,' as modern humans might say," says Professor Stanley Ambrose of the University of Illinois at Urbana-Champaign.

These cave-dwellers even cared for the elderly and infirm. An elderly male Neanderthal known as 'La-Chapelle-aux-Saints 1' had lost all his molar teeth, making it impossible for him to chew his food. But the bone above his tooth cavities had partially healed, suggesting that other Neanderthals chewed his food for him before feeding it to him.

Neanderthal home ranges were extremely small. Their tools are rarely found more than 50 kilometres (30 miles) from their source. Early modern humans maintained social networks over distances of up to 200 kilometres (124 miles). "Life for them was local - they didn't go abroad for their holidays. And they did very well as a result," says Gamble.

## Extinction

But the appearance of modern humans in Europe 40,000 years ago placed Neanderthals in direct competition with our ancestors for resources. It was a competition the Neanderthals would lose. Around 28,000 years ago, the last Neanderthals died out.

Computer simulations show that once Neanderthals and modern humans started interacting, a Neanderthal mortality rate just 2% higher than that of modern humans could have resulted in Neanderthal extinction within 1,000 years. But some researchers believe that Neanderthals didn't go extinct. Instead, they interbred with moderns, contributing genes to modern Europeans.

## Were they our ancestors?

In 1999, the skeleton of a child was unearthed in Lapedo, Portugal. Dated to around 25,000 years ago, the remains show a mixture of Neanderthal and modern features, suggesting it may be a hybrid. But small fragments of Neanderthal DNA extracted from three different specimens show that they were not closely related to any present day human populations.

## Classification

## Fact Files: Homo sapiens: (HOM-oh SA-pee-ens)

**Meaning:** 'Knowing man'.

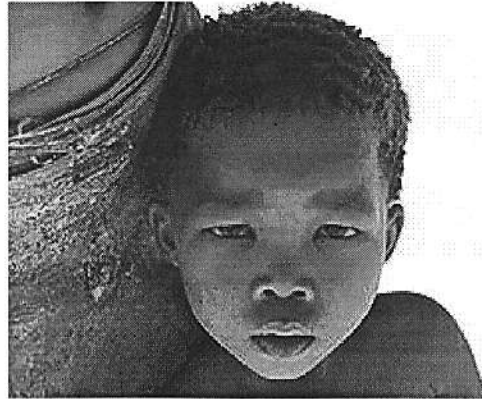
**Lived:** 150,000 - present.

**Range:** Worldwide.

**Diet:** Generalized diet.

**Size:** *M*: 175 cm / 65kg *F*: 161 cm / 54 kg.

**Brain Size:** c.1350cc.



-  Audio
-  Zoom
-  Movie
-  Scale
-  Skull

Views 1 | 2 | 3 | 4 | 5

### Description | Evidence

Our own species, *Homo sapiens*, evolved in Africa around 150,000 years ago. *Homo sapiens* have a characteristic look: their faces are small and tucked under a high, domed braincase. They have small eyebrow ridges and their lower jaw ends in a prominent chin. On average, their bodies are less muscular than those of earlier hominids.

The appearance of modern humans coincides with the appearance of highly crafted tools, efficient food-gathering strategies and a complex social organisation.

Early modern humans lived in mobile groups and established extensive social networks to trade goods and exchange gifts. These networks probably developed for the purpose of securing future favours when times were hard. And it seems that times were indeed hard for some of the first modern humans.

During the last Ice Age, humans were pushed to the edge of extinction, perhaps by famine and drought caused by a sharp drop in global temperatures. For these early modern humans, an increased reliance on social alliances and creativity was key to their survival.

► [More about \*Homo sapiens\*](#) (this will close this popup window).

